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WINDER

The invention relates to a winder with a contacting roller, which can be placed against the periphery of a reel.

At the end of a rotary printing press, a printed sheet is wound on a core, usually a cardboard tube. In the following, a known construction of a conventional winder is described first.

The core is held with drivable chucks between two roller arms of the winder. A contacting roller, which presses the sheet against the reel during the winding up process, can be placed against the periphery of the core or of the reel wound thereon. By these means, especially the inclusion of air bubbles between the individual reel layers is to be prevented. The contacting roller is not driven but, instead, runs freely along. It is placed against the reel with pneumatic cylinders. The pneumatic contacting mechanism and the contacting roller are carried by a carriage. When, as the radius of the reel increases, the pneumatic cylinders retract correspondingly, the carriage moves back a short distance, the pneumatic cylinders extending once again in order to keep the contacting roller in contact with the reel.

The core can be driven in opposite directions and the sheet is supplied either from above or from below to the gap between the reel and the contacting roller, depending on whether the sheet is to be wound up with the printed side on the inside or with the printed side on the outside.

The roller arms, which hold the core and the reel, can be swiveled about an axis. When a maximum reel radius is reached, the roller arms, with the full reel, swivel from a winding-up position into a removal position, in which the full reel

can be removed. At the same time, further roller arms, which carry a new, empty core, swivel into the winding-up position. Initially, the sheet is passed over a turn-around roller to the removal position and continues to be wound onto the full reel. However, it passes close by the empty reel core. At the same time, the contacting roller is disengaged so that it does not touch the sheet. At the empty core, a gluing site for gluing the sheet is prepared. The sheet is taken over by the empty reel in that the contacting roller, at the appropriate time, is placed against the empty core, so that the sheet is pressed against the gluing site and glued. At the same time, the sheet is severed between the empty core and the full reel by means of a coarsely serrated slice-cutting knife. The severed end of the old sheet is wound onto the old, full reel. On the new core, the short section of sheet, lying between the adhesive site and the cut position, is turned around and wrapped up in a new reel, when the sheet is wound onto the new core.

The conventional winder, which has been described, makes it possible to exchange a full reel for a new core while the printing press is running at full speed.

When changing over to a sheet of different width, the distance between the roller arms is varied depending on the length of the core. In this connection, the width of the sheet can be varied, for example, over a range from 100% to 50% of the maximum width. For the conventional winder described, the contacting roller must also be replaced by a roller of suitable length, since otherwise the roller arms with the driving mechanisms and the bearings for the chucks would come up against the longer contacting roller. Exchanging the contacting roller is labor intensive.

It is therefore an object of the invention to create a new winder, which makes a simpler shifting of the sheet width possible without exchanging the contacting roller.

Pursuant to the invention, this objective is accomplished by a winder of the type described above owing to the fact that the contacting roller is divided into at least two roller segments, of which at least one has a contacting mechanism, with which it can be engaged and disengaged independently of a different roller segment. The contacting roller may, for example, have a longer, central roller segment and be divided at its ends into several shorter roller segments. When there is a change in the sheet width, it is then no longer necessary to exchange the contacting roller. Instead, by engaging or disengaging suitable shorter segments at the ends of the contacting roller, the length of the contacting roller can be adjusted so as to fit the sheet width.

Such a winder clearly reduces work and saves time when the sheet width is change. In addition, it is no longer necessary to keep contacting rollers of different lengths in readiness.

Advantageous developments of the invention arise out of the dependent claims.

In the case of a preferred embodiment, the contacting roller is divided into a longer main roller segment and several shorter subsidiary roller segments, the main roller segment being disposed in the center and the subsidiary roller segments being disposed on either side of the main roller segment. The main roller segment is fastened securely to an oscillating link. On the other hand, each subsidiary roller segment has its own contacting mechanism, which is also fastened to the oscillating link. Independently of the other roller segments, each subsidiary roller segment can be placed with its contacting mechanism into a first and a second position. In the first position, the subsidiary roller segment is aligned axially with the main roller segment and, in the second position, the distance between it and the reel is greater than the distance between the main roller segment and the reel. By swiveling the oscillating link, the main roller segment with the subsidiary roller segments aligned axially with respect to it is placed against the core or the reel. A subsidiary roller segment in the

second position is so far removed from the axis of the core, that it cannot contact the roller arms with the driving mechanisms and bearings for the chuck. The roller segment can be placed suddenly against the reel or core with a pneumatic cylinder, in order to glue the sheet to a gluing site on an empty core while the printing press is running.

The sheet is severed preferably with a coarsely serrated slice-cutting knife, which, similarly to the contacting roller, is divided into several knife segments. Preferably, the slice-cutting knife is divided at the same axial positions as the contacting roller and, during the severing of the sheet, the knife segments, corresponding to the contacting roller segments, are displaced, so that they sever the sheet.

The arrangement of the slice-cutting knife, as well as the construction of a device for exchanging a full first reel for an empty core of a second reel can be configured in the manner, known from the state of the art that has been described. For this purpose, the divided slice-cutting knife is disposed preferably in such a manner with respect to the core of an empty reel and a sheet, which is passed by the core of the empty reel and wound onto a full reel, that the sheet, clamped between the engaged roller segments and the core by the sudden placement of the roller segments against the core, can be severed by a simultaneous displacement of the corresponding knife segments at a place between the core of the empty reel and the full reel.

Preferably, if the axes of the winder and of the divided contacting roller are disposed in an essentially horizontal plane, a divided slice-cutting knife is disposed below as well as also above the divided contacting roller. The sheet can then be supplied over turn-around rollers from above as well as from below the gap between the divided contacting roller and the reel, depending on whether the sheet is to be wound up with the printed side on the inside or with the printed side on the outside.

In a further development of the inventive winder, the oscillating link with the main roller segment, mounted thereon, and the contacting mechanisms of the subsidiary roller segments can be adjusted in the axial direction relative to the reel and to a carriage, which carries the oscillating link. This enables the length of the contacting part of the contacting roller to be adapted more precisely to the sheet width, because the sheet width can then also be changed by the width of an individual subsidiary roller segment, in that, for example, in the case of an asymmetrical configuration, for which only a subsidiary roller segment is engaged next to the end of the main roller segment, the contacting roller is aligned onto the sheet by the axial adjustment. In addition, such an axial adjustment enables the contacting roller to be aligned at all times so that the edge of the contacting roller or of a roller segment does not coincide with the end of the reel, which would lead to undesirably high edge compressions. Instead, the contacting roller can be adjusted so that it protrudes on both sides over the reel. For this purpose, the chucks for the core preferably have a collar on the outside, the peripheral surface of which is flush with the peripheral surface of the core.

The divided slice-cutting knife, if present, preferably can be shifted here together with the oscillating link of the roller segments, so that it can be adapted appropriately to the sheet width and the axial position can be adapted appropriately relative to the reel.

In the following, an example of the invention is explained in greater detail by means of the drawing, in which

Figure 1 shows part of a cross section through an inventive winder, for which all roller segments are engaged;

Figure 2 shows a horizontal, longitudinal section through the winder of Figure 1 at the level of the contacting level,

Figure 3 shows a part of a cross section through the winder, for which only a main roller segment is engaged,

Figure 4 shows a longitudinal section at the level of the contacting roller of the winder of Figure 3,

Figures 5a to 5c show sketches of engaged and disengaged roller segments for various sheet widths,

Figures 6a to 6e each show a cross section through an inventive winder in various phases of the winding-up process,

Figure 7 shows a section of Figure 6e with the contacting roller and two slice-cutting knives and

Figure 8 shows a longitudinal section at the level of a slice-cutting knife through the winder of Figure 7.

Figure 1 shows part of a cross section through an inventive winder with contacting roller 10, which presses a sheet 12 against a core 13 of a reel 14. The core 13 of the reel 14 is held with chucks 16, which can be driven, between two roller arms 18.

The contacting roller 10 is divided into several roller segments, which are disposed coaxially in Figure 1. An axle 20 of the main roller segment of the contacting roller 10 is fastened at its two ends with two holding devices 22 at a longitudinal strut 24 of an oscillating link 26. The oscillating link 26 is mounted with

one axle 28 at a carriage 30. The oscillating link 26 with the main roller segment of the contacting roller 10 can be placed against the core of the reel 14 by means of a pneumatic cylinder 32. On the other hand, the position of the oscillating link can be adapted to the periphery of the reel 14 with the carriage 30, on which the oscillating link 26, and, with that, also the contacting roller 10 are fastened.

In the image plain of Figure 1, several coaxially disposed subsidiary roller segments 34 (Figure 2), with, in each case, a contacting mechanism 36 with an oscillating link 38 and a pneumatic cylinder 40, which are mounted at a longitudinal strut 42 at the oscillating link 26, are located behind the main roller segment of the contacting roller 10, which is shown in cross section.

The carriage 30 has cutouts 44, into which protrude the roller arms 18 with driving mechanisms and bearings for the chucks 16 of the still almost empty reel 14.

Figure 2 shows a longitudinal section through the winder of Figure 1 at the level of the axis 20 of the contacting roller 10. The contacting roller 10 is divided into a central, main roller segment 46 and eight subsidiary roller segments 34, which are disposed at the ends of the main roller segment 46. The main roller segment 46, the length of which corresponds essentially to a minimum width of the sheet 12, occupies about 50% of the maximum length of the contacting roller 10. By engaging the shorter subsidiary roller segments, the length of the contacting roller 24 can be adjusted stepwise over a range of 50% to 100% of the maximum length of the contacting roller.

Furthermore, the holding devices 22, with which the main roller segment 46 is fastened to the longitudinal strut 24 of the oscillating link 26, is shown. The pneumatic cylinders 40 at the oscillating link 38 of the subsidiary roller segments

34 are fastened to the longitudinal strut 42 of the oscillating link 26. The axle 28, with which oscillating link 26 is mounted at the carriage 30, is also shown.

The core 13 of the still empty reel 14 is slipped at its two ends onto the driven chucks 16 and is held by the roller arms 18. The chucks for the core 13 in each case have, on the outside, a collar 48, the peripheral surface of which is flush with the peripheral surface of the core 13.

Figure 3 shows the part of the cross section of the winder of Figure 1, for which the subsidiary roller segments 34 are now in a second position, in which they are not in contact with the reel 14. The pneumatic cylinders 40 are retracted, as a result of which the oscillating links 38 are swiveled about the axle 50. Only the main roller segment 46 is placed against the reel 14.

Figure 4 shows a longitudinal section through the configuration of the winder, shown in Figure 3. The length of the core 13 of the reel 14 is less here than the length of the main roller segment 46 and the roller arms 18 are brought to a corresponding spacing. The subsidiary roller segments 34, which are not engaged, are so far removed in this position from the central axis 52 of the core 13, that they do not come into contact with the roller arms 18 with the driven chuck 16.

In Figure 5, different configurations of the winder width, in each case different sheet widths are sketched. Figure 5a shows a configuration with one contacting subsidiary roller segment. Figure 5b shows a configuration with two contacting subsidiary roller segments and Figure 5c a configuration with four contacting subsidiary roller segments.

Figure 5a shows an embodiment of the winder, for which the main roller segment 46 and the subsidiary roller segments 34 of the contacting roller 10 can be shifted relative to the reel 14. In the asymmetric configuration shown, only one

subsidiary roller segment 34 is aligned coaxially with the main roller segment 46 so that the reel 14 can have a sheet width, which is between the length of the main roller segment 46 and the length of the main roller segment 46 with two engaged subsidiary roller segments 34, as is the case in Figure 5b. Aside from a more precise matching to the width of the sheet, this adjustment also enables the contacting roller 10 to be aligned so that the outer edge of the contacting roller segments of the contacting roller 10 do not coincide with the ends of the reel 14. The contacting roller 10 is adjusted so that it protrudes beyond the reel 14 on either side, so that undesirably high edge compressions are avoided.

Figures 6a to 6e show a sequence of different stages during the winding up process. A cross section is shown through the winder, already shown in Figures 3 and 4, for which some subsidiary roller segments 34 of the contacting roller 10 are not aligned coaxially with the main roller segment 46 and, instead, are in the second position shown in Figure 3. By these means, the width of the contacting roller 10 is adapted to the width of the sheet 12. The oscillating link 26, which carries the main roller segment 46 and the subsidiary roller segments 34 with their contacting mechanisms 36, is mounted with its axis 28 on the carriage 30 and can be swiveled about the axis 28 by the pneumatic cylinder 32, which is disposed in series with a further pneumatic cylinder 52. The carriage 30 is mounted movably on rails 54, which are fastened to a frame 56. The sheet 12 is passed by turn-around rollers 58 to the gap between the contacting roller 10 and the reel 14. In the configuration shown, the sheet is provided from above. Alternatively, the sheet can also be supplied from below over the turn-around rollers 60, as indicated by the line of dots and dashes. A slice-cutting knife 62, the construction of which is explained below by means of Figure 7, is mounted on the carriage 30 above and below the oscillating link 26.

The reel 14 is held at the roller arms 18, which can be swiveled jointly with other roller arms 64 about an axle 66. As the roller arms 18 and 64 are swiveled

about the axle 66, further turn-around rollers 68 at a supporting part 70 are also moved.

In Figure 6a, the reel 14 is still almost empty. On the other hand, Figure 6b shows a stage of the winding-up process, for which the periphery of the reel 14 on the core 13 is clearly greater. At the same time, the carriage 30 was shifted on the rails 54 and the pneumatic cylinder 32 continues to press the contacting roller 10 against the periphery of the reel 14.

In Figure 6c, the reel 14 is wound approximately to a maximum reel radius. The carriage 30 has been moved back correspondingly far. A core 72 with a prepared adhesive site 74 for a second reel 75 is held at the roller arms 64. The roller arms 18 exchange positions with the roller arms 64 by being swiveled in the direction of arrow 76.

The resulting state is shown in Figure 6d. The new, empty core 72 of the reel 75 here is in the position next to the contacting roller 10. The pneumatic cylinder 52, however, is retracted so far, that the contacting roller 10, fastened to the oscillating link 26, does not contact the sheet 12. The sheet 12 also does not contact the core 72 and, instead, passes by the core 72 over the turn-around rollers 68 to the full reel 14, where it continues to be wound up. At the same time, the prepared adhesive site 74 (Figure 6c) at the empty core 72 faces the contacting roller 10.

Figure 6e shows the instant at which, due to a sudden extension of the pneumatic cylinder 52, the oscillating link 26 presses the contacting roller 10 against the empty core 72. At the same time, the sheet 12 is pressed against the prepared adhesive site 74 (Figure 6c) and glued to the core 72. Simultaneously, the lower of the two slice-cutting knives 62 is displaced, so that it cuts the sheet 12 at a place between the core 72 and the reel 14. During the further winding up, the shorter free end 76 of the sheet 12 is wrapped in the reel 72, while the severed, longer rest 78 of

the sheet 12 continues to be wound on the reel 14. During this exchange of reels, the printing press can continue to run at full speed. The full reel 14 can now be removed from the winder, so that the state, shown in Figure 6a, can be reached once again.

Figure 7 shows a portion of the cross section of the winder of Figure 6c, in which the slice-cutting knife 62 is shown in greater detail. In each case, a segment of the upper and of the lower slice-cutting knife 62 is shown. Each knife segment has a coarsely serrated blade 80, which is fastened to the fundamental part 82 of the knife segment. The fundamental part 82 is fastened over swiveling arms 84 to a longitudinal strut 86 of the carriage 30. By an extension of the pneumatic cylinder 88, which is fastened to the carriage 30 over further longitudinal struts 90, the lower cutting-slice knife is displaced into the position indicated by broken lines. The remainder 78 of the sheet 12, severed during the displacement by the lower knife 62, is indicated by broken lines.

Figure 8 shows a longitudinal section through the winder at the level of a slice-cutting knife 62. Like the contacting roller 10, the slice-cutting knife 62 is divided into segments. All segments of the knife 62 can be displaced independently of one another by the pneumatic cylinders 88. A displaced position 92 of the blades 80 of the slice-cutting knife 62 is shown by broken lines. The longer, middle segment 94 of the knife is moved by two pneumatic cylinders 88, whereas the shorter knife segments 95 are moved in each case by a pneumatic cylinder 88.

Although the principle of the invention was described by means of a special embodiment, the latter is to be regarded merely as an example of an inventive winder. However, the idea of the invention is not limited to the example described. For example, a different distribution of the lengths of the roller segments is conceivable. In particular, however, the conversion of the inventive concept for winders of a different construction is also conceivable.